THE USE OF THE SYMPOSIUM IN SCIENCE EDUCATION[1]

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ABSTRACT

The range of activities available for student participation in Mentor Ridge Junior High School's science club has been broadened to include the presentation of research in the form of papers before critical groups. Scientific meetings were devised similar in format to professional Academy meetings.

Two symposia were held at the school, one in 1963, another in 1964. The sessions were found to be adaptable to educational use and are offered as supplementary or alternative to existing co-curricular programs. The symposia fostered scientific inquiry and a critical attitude toward scientific research, provided highly realistic settings for scientific communication, were easy to organize, and offered a variety of experiences communicating the results of research. The greatest disadvantage was the limited number of participants accommodated, though this defect may be overcome. Five days seemed the best length of time to run the program.

It has been somewhat traditional for science teachers and science departments in public secondary schools to sponsor two kinds of co-curricular or extra-curricular activities—the science club and the science fair. A wider choice of co-curricular activities is needed. Since 1962 we have experimented with an activity that might help to meet this need and supplement existing programs—the science symposium. The purposes of this paper are to describe our program and to evaluate some of its results. The staff and the students of Mentor Ridge Junior High School are to be thanked for their cooperation in helping make this study possible. Also to be thanked is Dr. Ralph W. Dexter of Kent State University, Kent, Ohio, for his suggestions on the manuscript.

Science educators in junior and senior high schools are faced with several significant problems, the solutions to which have fallen into the co-curricular area. One of these problems is the provision of enrichment experiences and the encouragement and recognition of superior science talent. The second problem is the need for interpreting the school's science program to the public. Third is the challenging problem of interpreting science as a profession to the student. Under this last point would fall all those devices that would interpret what scientists do, how they communicate, and opportunities in the various fields of science; all with the view of possibly interesting qualified young people in a scientific career. The typical device that has been used to solve these problems has been the science fair.

BACKGROUND

Barnard (1960) and Barry (1959) both mentioned the mistaken image of science viewed only as a product or result, rather than as a method and way of thinking. Students should be given insight and experience into the intellectual nature of science. Schulz (1964) described a curricular program in which many of the skills of scientific inquiry were taught during the elementary and junior high school years. Youngsters should have experiences in observing, measuring, predicting, formulating hypotheses, testing ideas, recognizing assumptions and limitations, and designing experiments, continued Schulz. We feel that the symposium offers many such experiences in the co-curricular field.

The range of activities and experiences open to students in the co-curriculum was of concern to Richardson (1961), who suggested that science clubs offer a variety of opportunities for participation. Kigner (1964) discussed the inadequacy of such activities as repeating experiments already proved, making collections, and learning complex procedures. Such experiences may enrich the content

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of a science course but may also limit the student's range of possible activities when done outside the formal curriculum. This pitfall is probably common to most co-curricular programs.

A balance must be maintained between the time spent on scientific inquiry and the interpretation of research to others, a concern of Kigner (1964), Richardson (1961), and Barry (1959) with regard to science fairs. This also became a concern of ours. We found that the symposium fosters both research and interpretive activities because each project or paper must be adequately described (and sometimes defended) before highly critical groups of students. Research methods and their interpretation were described by Goldstein (1957) in an excellent little book for students.

OBJECTIVES

The primary objective of the symposium is the promotion of scientific thought, inquiry, and research. At Mentor Ridge Junior High School, we start by describing the program to the teaching staff and science club early in September (table 1). Instructors are encouraged to identify the major areas of scientific interest of their students and to help develop those interests. In our situation, interest may be latent until a responsive chord is struck by a stimulating contact with other students or with teachers. Students are then led to do research in the major

TABLE 1

A chronological check-list for the organization of the science symposium

Suggested month	Activity
September	General meeting, science staff, to interpret symposium; appoint symposium committee members
September	General meeting, science club, to interpret symposium; appoint symposium committee members
October	Meeting, symposium committee; decide theme and tentative dates for the symposium
October	Optional: make arrangements for public sessions of the symposium
November	Encourage all staff members to help interested students; make facilities and materials available
November	Contact an adult participant to help conclude the series
December	Obtain list of all possible participants (contact periodically to check progress)
March	"Trial runs" of all papers in the classroom (get comments from teachers)
April	Meeting, symposium committee to hear abstracts of all possible papers; decide finalists and sequence of papers
April	Workshop sessions for participants on communication techniques
April	Make arrangements for: space and other facilities, publicity, printed programs
May	Meet with co-chairmen of each session to plan meetings; last minute check of all activities including publicity
May	Visit as many sessions of the symposium as possible
May	Plan evaluation of program; discuss recommendations for the future

fields of their interest. They may prefer to work individually or in teams; the latter works especially well when one student assumes a leadership role acceptable to the others. Intructors supervise research projects in areas where by training the teacher is best qualified.

One of the secondary objectives of the symposium is the provision of a highly realistic setting in which students may communicate. Prior to the actual program, students are taught to communicate by a variety of methods, including audio, graphic, and visual. The format of the final symposium is comparable to the annual sessions of The Ohio Academy of Science.

Another secondary objective is the interpretation of the school's science program to the public. Due to limited student participation, the symposium must be augmented by an activity allowing for the display of more projects. We have

combined an "open-house" type of program with the symposium. Publicity is given to both phases of the event.

METHODS

The best type of program to us seemed to be one that combined some of the best elements of the science fair and science congress with the type of scientific meeting with which we are all quite familiar. For the sake of continuity, we gave it a unifying theme and called it a symposium.

The first symposium was held at Ridge School during the week of 13 May, 1963. Our school enrollment during that year was small (about 425 students) and the science department consisted of only a few members; our program was thus structured rather informally. A science club was organized during the fall of 1962; the symposium idea was presented to the members and to the staff; the groundwork was laid. A symposium committee was established, consisting of both staff and student members. The committee decided on a theme and set up tentative dates for the series. Science teachers were asked to encourage and guide any of their students interested in participating in the program. The participants were called together to discuss their projects with the symposium committee. Nine "papers" were selected to be presented.

The theme of this first symposium was "scientific communication." Some help on an informal basis was given to all participants to help them develop skills in communicating with groups of people. The series ran for one week; several papers were scheduled for each daily session. We utilized our noon activity (homeroom) periods and the most suitable room available. Five demonstrations, two descriptions of original experiments, and two illustrated talks were presented. Comparatively few papers were encouraged because of the experimental nature of the program. The final paper was presented by our school principal. The response of the students was excellent; most of the meetings were filled to capacity. Several meetings of general interest were open to the entire student body and were held in large lecture rooms or in the school library.

The second symposium was held in the spring of 1964. It was considerably expanded to include more participants; a doubled school enrollment coupled with the inclusion of another grade level made this necessary. We were also encouraged by the apparent success of the pilot program. The science teaching staff and the science club were again asked to co-sponsor the symposium. The staff included many new members and it was necessary to orient them to the program; this was accomplished at regular staff meetings early in the school year. A symposium committee, again consisting of both student and staff members, decided to run an eight-day series under the theme of "research." One of the sessions was co-sponsored by the local Parent Teacher's Association unit and was held in the evening for the benefit of parents. Two events preceded the symposium: a "trial run" of the paper in the classroom and an orientation program for participants which was chiefly concerned with the techniques of presentation.

Most of the second symposium's sessions were open to the entire school; several meetings were run concurrently. Each meeting was presided over by one teacher and one student, serving as co-chairmen. The school plant had been previously expanded to include several large lecture rooms and an expanded library, of which we took advantage. Types of presentations for these meetings included: fourteen illustrated talks, four descriptions of original research, three demonstrations, and two construction projects.

The general format of both year's symposia was similar. Each paper was followed by a lively discussion period; we usually had to conclude these in the midst of spirited comments and rebuttals. Printed programs, outlining all papers, dates, times, and places of meetings, were duplicated and issued to as many students, teachers, and parents as were interested; newspaper publicity was also used. Each year we concluded our series with the presentation of a paper by an adult. chosen to illustrate the theme of the symposium.

DISCUSSION

Certain aspects of the science symposium need a somewhat fuller treatment; these being orientation, organization, and a tentative evaluation. The importance of orientating both students and staff to the aims, methods, possibilities, and problems of the program must be stressed. Early in the school year, we described these aspects to our staff and asked them to discuss and to publicize the program to their students. Science teachers handled the development of papers in various ways. Some staff members required projects of their students and simply selected the best of these for presentation. Others encouraged any student interested in the possibility of presenting something, or narrowed the range by encouraging several promising students. Needless to say, there was some indifference to the whole project. All members of the science club were encouraged to make a contribution; the symposium proved a means of interesting some students in the club's activities, though club members continued to be the major participants.

Other phases of the orientation program included a "dry run" of the papers in class, which helped give youngsters a little more self-confidence and a chance to add polish to their papers. Finalists were chosen by the symposium committee, who heard preliminary abstracts of all possible papers, after determining how many papers could be accommodated. The final task under the heading of orientation was to hold a seminar on the techniques of communication, including public speaking, display, and the use of audio-visual equipment. Filmstrip, opaque, overhead, and slide projectors were demonstrated. Finalists were advised that they would probably be "put on the spot" with questions from the audience, and were thus encouraged to explore all phases of their projects.

The organization of the symposium is rather simple once the groundwork has been laid. Table 1 contains a check-list of the various organizational phases in sequence. Publicity within the school is important, since attempts are made to reach all interested students, either as active participants or as spectators. The public address system and other display methods are used. The most essential contact, however, is with teachers. Publicity for a public meeting was handled through the local news media.

Scheduling the meetings is an easy task; there is no need for either very large spaces or for special, mobile facilities. If a paper requires the use of laboratory facilities, we schedule it for a science room or use the mobile lab unit. Meetings of general, widespread interest are scheduled for rooms with maximum seating capacity. Concurrent meetings are run when it is expected that the papers may be of somewhat limited interest. However, our publicity was so convincing in some cases that meetings "overdrew" spectators. All of our regular meetings were scheduled during the mid-day activities periods or homeroom periods. A brief (but spirited) discussion period followed each paper and was led by the presiding co-chairmen. Discussion time often needed to be lengthened due to the numbers of excellent questions raised by students. We felt that these discussion periods were of great value to both participants and auditors alike; everyone was attentive with an interest seldom achieved in the classroom; very few questionable points went unchallenged. Youngsters were learning to be critical in a constructive manner. A typical session was set up this way:

Wednesday, 15 April

A and B periods (starting at 12 noon). Room #304. Kathleen Ruddy and Mr. Stevenson, presiding.

"Some Basic Drives in the Mouse." Bill Kern. Illustrated report of experimental results. 5 minutes.

"Influence of Thyroxin on Amphibian Metamorphosis." Jack Clapp and Cindy Patterson. Experimental results, illustrated. 5 minutes.

"Some Optical Illusions." Carol Daisley and Linda Luoma. Demonstration and talk. 8 minutes.

"Bulb-forcing of Flowering Perennials." John Johnston. Experimental results, illustrated. 5 minutes.

It is of considerable advantage to start and end each symposium with a promising paper, to encourage interest in the beginning and to maintain it through to the end. Our closing paper, as was previously mentioned, was given by an adult to help tie the symposium's theme together. We feel that the use of non-student personnel at crucial times, to help illustrate a point or give the series continuity, is helpful. We would not choose, however, to rely upon outside sources for the bulk of our program.

EVALUATION

An evaluation of the results of such an experimental program is difficult and must be of a tentative nature. As we see them, the main advantages of the symposium are: the realism of its setting, ease of organization, breadth of talents and activities that may be called upon to participate actively, increased group learning, and the presence of a unifying theme. The symposium is patterned after the format of most formal scientific meetings and therefore interprets the scientific world in realistic terms. We have already discussed the simplicity of symposium organization and its use of existing facilities with a minimum of disruption. That a student may be called upon to communicate his interests using a wide possible variety of techniques and media is an important point. The training that he receives in developing the use of audio, visual, and graphic methods of communication, along with the ability to talk before groups of people, is invaluable experience. The challenge offered to listeners is great, too; youngsters learn to listen attentively and constructively challenge any dubious points. All this constitutes a prime learning situation, one hard to duplicate in most other settings.

The problems and disadvantages of the symposium are largely inherent in its format. The greatest disadvantage is the somewhat limited number of participants accommodated, in contrast with the science fair. This can be partially resolved by running concurrent meetings. There are probably other ways of resolving this problem. One method was in having a science "open-house" concurrently with the 1964 symposium; the work of many students was displayed in the science wing of the building. We will explore techniques similar to this in the future.

Another problem was deciding the best length of time for a single symposium to last. The attention and interest span of young adolescents for this sort of program seemed to be in the neighborhood of one week. Our first series, which lasted five days, was much more successful in this regard than the second series, which ran for eight days.

SUMMARY AND CONCLUSIONS

Two symposia of scientific papers presented by students were held at Mentor Ridge Junior High School. The sessions were patterned after typical professional scientific meetings; their themes were on the subjects of scientific communication and research.

The symposia were generally well received. The symposium is adaptable to educational use and is offered as a supplementary or alternate program. One week seemed the best length of time for such a series. Though numbers of entries are somewhat limited by the symposium's format, it makes good use of existing facilities, is not disruptive of the school's regular program, is simple to organize, makes use of a variety of communicative techniques, provides an excellent learning situation for both participants and non-participants, has a unifying theme around which to build a meaningful program, can be used to help build good public relations, provides a realistic setting for scientific discussion and communication, and fosters scientific inquiry and research.

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